

ABSTRACT

A method for manufacturing an improved APD structure and an improved manner of operating APD's particularly beneficial for a single photon detection applications are provided. An APD is provided having an absorption region, a control region, and a multiplication region, wherein the multiplication region has a k value of approximately 1. In one example the multiplication region comprises a doped InP layer. The field control layer is designed so as to produce a reduction of electric field that is equal to the multiplication region's breakdown electric field, plus or minus $5\text{V}/\mu\text{m}$. The method comprises applying a potential across the APD so as to induce an electric field across the multiplication region that exceeds the breakdown field; while having the control region shield the absorption region to prevent excessive noise.